claims.

11 page of claims.

43. A method for concurrently isolating at least a portion of both a selected compound and biological contaminants from a fluid stream, the method comprising:

(a) directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;

(b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

(c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane;

(d) applying at least one voltage potential across at least the first and second fluid streams, wherein the application of such at least one voltage potential causes movement of at least a portion of at least one of the selected compound and the biological contaminants though the first selective membrane into the second fluid stream, wherein the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream; and

(e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound.

44. The method according to claim 43 wherein the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in the first fluid stream.

45. The method according to claim 43 wherein the step of directing the third fluid stream comprises directing the third fluid stream so as to be separated from the second fluid stream by the second selective membrane.

46. The method according to claim 45 wherein the second selective membrane has a preselected pore size so as to substantially prevent at least one of the selected compound and selected biological contaminants removed to the second fluid stream from migrating through the

second selective membrane into the third fluid stream and substantially retain the at least one of the selected compound and selected biological contaminants in the second fluid stream.

47. The method according to claim 46 wherein the application of a voltage potential across the third fluid stream causes movement of at least a portion of at least one of the selected compound and selected biological contaminants removed to the second fluid stream through the second selective membrane into the third fluid stream.

48. The method according to claim 46 wherein the method further comprises directing a fourth fluid stream separated from the first fluid stream by a third selective membrane, wherein the preselected pore size of the third selective membrane allows selective migration of components in the first fluid stream through the third selective membrane into the fourth fluid stream.

49. The method according to claim 48 wherein the third selective membrane has a preselected pore size so as to substantially prevent at least one of the any selected compound remaining in the first fluid stream, any biological contaminants remaining in the first fluid stream, and any other compounds remaining in the first fluid stream from migrating through the third selective membrane into the fourth fluid stream and substantially retain the at least one of the selected compound, biological contaminants, and other components in the second fluid stream.

50. The method according to claim 48 wherein the application of a voltage potential across the fourth fluid stream causes migration of at least a portion of at least one of any selected compound remaining in the first fluid stream, any biological contaminants remaining in the first fluid stream, and any other compounds remaining in the first fluid stream through the third selective membrane into fourth fluid stream.

51. The method according to claim 43 wherein the step of directing a third fluid stream directing the third fluid stream so as to be separated from the first fluid stream by the second selective membrane.

52. The method according to claim 51 wherein the second selective membrane has a preselected pore size so as to substantially prevent at least one of the any selected compound remaining in the first fluid stream, any biological contaminants remaining in the first fluid stream, and any other compounds remaining in the first fluid stream from migrating through the second selective membrane into the third fluid stream and substantially retain at least one of the selected compound, biological contaminants, and other components in the first fluid stream.

53. The method according to claim 51 wherein the application of a voltage potential across the third fluid stream causes migration of at least a portion of at least one of any selected compound remaining in the first fluid stream, any biological contaminants remaining in the first fluid stream, and any other compounds remaining in the first fluid stream through the second selective membrane into third fluid stream.

54. The method according to claim 51 wherein the method further comprises directing a fourth fluid stream separated from the second fluid stream by a third selective membrane, wherein the preselected pore size of the third selective membrane allows selective migration of components in the second fluid stream through the third selective membrane into the fourth fluid stream.

55. The method according to claim 54 wherein the third selective membrane has a preselected pore size so as to substantially prevent at least one of the selected compound and selected biological contaminants removed to the second fluid stream from migrating through the third selective membrane into the fourth fluid stream and substantially retain the at least one of the selected compound and selected biological contaminants in the second fluid stream.

56. The method according to claim 54 wherein the application of a voltage potential across the fourth fluid stream causes movement of at least a portion of at least one of the selected compound and selected biological contaminants removed to the second fluid stream through the third selective membrane into the fourth fluid stream.

57. The method according to claim 43 wherein the method further comprises periodically stopping and reversing the voltage potential to cause movement of at least any compounds of the first fluid stream having entered the first selective membrane to move back into the first fluid stream and wherein substantially not causing any of the selected compound and biological contaminants that have entered the second fluid stream to re-enter the first fluid stream.

58. The method according to claim 43 wherein the first fluid stream further includes a compound from which the selected compound is separated, wherein such compound is selected from the group consisting of blood proteins, immunoglobulins, recombinant proteins, and combinations thereof.

59. The method according to claim 43 wherein the biological contaminant is selected from the group consisting of viruses, bacteria, prions, yeast, lipopolysaccharides, toxins, endotoxins, and combinations thereof.

60. The method according to claim 43 wherein the pH of the first fluid stream is selected by selectively adding a buffer having the required pH and the pH is selected at one of a pH lower than the isoelectric point of the compound, a pH about the isoelectric point of the compound, and a pH higher than the isoelectric point of the compound.

61. A method for concurrently isolating at least a portion of both a selected compound and biological contaminants from a fluid stream, the method comprising:

(a) directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;

(b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

(c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane;

(d) applying at least one voltage potential across at least the first and second fluid streams, wherein the application of such at least one voltage potential causes movement of at least a portion of the biological contaminants though the first selective membrane into the second fluid stream while the selected compound is prevented from entering the second fluid stream, wherein the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream; and

(e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound.

62. The method according to claim 61 wherein the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in the first fluid stream.

63. The method according to claim 61 wherein the step of directing the third fluid stream comprises directing the third fluid stream so as to be separated from the first fluid stream by the second selective membrane.

64. The method according to claim 63 wherein the second selective membrane has a preselected pore size so as to substantially prevent at least one of the selected compound and selected biological contaminants remaining in the first fluid stream from migrating through the second selective membrane into the third fluid stream and substantially retain at least one of the selected compound and selected biological contaminants in the first fluid stream.

65. The method according to claim 63 wherein the application of a voltage potential across the third fluid stream causes movement of at least a portion of at least one of the selected compound and selected biological contaminants remaining in the first fluid stream through the second selective membrane into the third fluid stream.

66. The method according to claim 63 wherein the method further comprises directing a fourth fluid stream separated from the second fluid stream by a third selective membrane, wherein the preselected pore size of the third selective membrane allows selective migration of components in the second fluid stream through the third selective membrane into the fourth fluid stream.

67. The method according to claim 66 wherein the third selective membrane has a preselected pore size so as to substantially prevent at least one of any biological contaminants removed to the second fluid stream and any other compounds in the second fluid stream from migrating through the third selective membrane into the fourth fluid stream and substantially retain the at least one of the selected biological contaminants and other components in the second fluid stream.

68. The method according to claim 66 wherein the application of a voltage potential across the fourth fluid stream causes migration of at least a portion of at least one of any biological contaminants removed to the second fluid stream, and any other compounds in the second fluid stream through the third selective membrane into fourth fluid stream.

69. The method according to claim 61 wherein the step of directing a third fluid stream directing the third fluid stream so as to be separated from the second fluid stream by the second selective membrane.

70. The method according to claim 69 wherein the second selective membrane has a preselected pore size so as to substantially prevent at least one of any biological contaminants removed to the second fluid stream and any other compounds in the second fluid stream from migrating through the second selective membrane into the third fluid stream.

71. The method according to claim 69 wherein the application of a voltage potential across the third fluid stream causes migration of at least a portion of at least one of any biological contaminants removed to the second fluid stream, and any other compounds in the second fluid stream through the second selective membrane into third fluid stream.

72. The method according to claim 69 wherein the method further comprises directing a fourth fluid stream separated from the first fluid stream by a third selective membrane, wherein the preselected pore size of the third selective membrane allows selective migration of components in the first fluid stream through the third selective membrane into the fourth fluid stream.

73. The method according to claim 72 wherein the third selective membrane has a preselected pore size so as to substantially prevent at least one of the selected compound and selected biological contaminants remaining in the first fluid stream from migrating through the third selective membrane into the fourth fluid stream and substantially retain at least one of the selected compound and selected biological contaminants in the first fluid stream.

74. The method according to claim 72 wherein the application of a voltage potential across the fourth fluid stream causes movement of at least a portion of at least one of the selected compound and selected biological contaminants remaining in the first fluid stream through the third selective membrane into the fourth fluid stream.

75. The method according to claim 61 wherein the method further comprises periodically stopping and reversing the voltage potential to cause movement of at least any compounds of the first fluid stream having entered the first selective membrane to move back into the first fluid stream and wherein substantially not causing any of the selected compound and biological contaminants that have entered the second fluid stream to re-enter the first fluid stream.

76. The method according to claim 61 wherein the first fluid stream further includes a compound from which the selected compound is separated, wherein such compound is selected from the group consisting of blood proteins, immunoglobulins, recombinant proteins, and combinations thereof.

77. The method according to claim 61 wherein the biological contaminant is selected from the group consisting of viruses, bacteria, prions, yeast, lipopolysaccharides, toxins, endotoxins, and combinations thereof.

78. The method according to claim 61 wherein the pH of the first fluid stream is selected by selectively adding a buffer having the required pH and the pH is selected at one of a pH lower than the isoelectric point of the compound, a pH about the isoelectric point of the compound, and a pH higher than the isoelectric point of the compound.

79. A method for isolating at least a portion of a selected compound from a fluid stream, the method comprising:

(a) directing a first fluid stream having a selected pH and including at least a selected compound so as to flow along a first selective membrane;

(b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

(c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane;

(d) applying at least one voltage potential across at least the first and second fluid streams, wherein the application of such at least one voltage potential causes movement of at least a portion of the selected compound though the first selective membrane into the second fluid stream, wherein the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream; and

(e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound.

80. The method according to claim 79 wherein the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in the first fluid stream.

81. The method according to claim 79 wherein the method further comprises directing a fourth fluid stream separated from the other of the first and second fluid streams by a third selective membrane, wherein the preselected pore size of the third selective membrane allows selective migration of components in the other of first and second fluid streams through the third selective membrane into the fourth fluid stream.

82. A method for isolating at least a portion of a selected compound from a fluid stream, the method comprising:

(a) directing a first fluid stream having a selected pH and including at least a selected compound so as to flow along a first selective membrane;

(b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

(c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane;

(d) applying at least one voltage potential across at least the first and second fluid streams, wherein the application of such at least one voltage potential causes movement of at least a portion of components in the first fluid stream through the first selective membrane into the second fluid stream while the selected compound is prevented from entering the second fluid stream, wherein the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream; and

(e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound.

83. The method according to claim 82 wherein the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in the first fluid stream.

84. The method according to claim 82 wherein the method further comprises directing a fourth fluid stream separated from the other of the first and second fluid streams by a third selective membrane, wherein the preselected pore size of the third selective membrane allows selective migration of components in the other of first and second fluid streams through the third selective membrane into the fourth fluid stream.

85. A system for concurrently isolating at least a portion of both a selected compound and biological contaminants from a fluid stream, the system comprising:

means for directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;

means for directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

means for directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane; and

means for applying at least one voltage potential across at least the first and second fluid streams, wherein the application of such at least one voltage potential causes movement of at least a portion of at least one of a selected compound and the biological contaminants though the first selective membrane into the second fluid stream, wherein the preselected pore size of the second selective membrane allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream.

86. A system for concurrently isolating at least a portion of both a selected compound and biological contaminants from a fluid stream, the system comprising:

means for directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;

means for directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

means for directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane; and

means for applying at least one voltage potential across at least the first and second fluid streams, wherein the application of such at least one voltage potential causes movement of at least a portion of the biological contaminants though the first selective membrane into the second fluid stream while the selected compound is prevented from entering the second fluid stream, wherein the preselected pore size of the second selective membrane allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream.